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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/478,812	01/07/2000	Yukiyasu Sugano	SON-1718	2204

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EXAMINER

LEE, EUGENE

ART UNIT PAPER NUMBER

2815

DATE MAILED: 02/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

H-P

Office Action Summary

Application No.

09/478,812

Applicant(s)

SUGANO ET AL.

Examiner

Eugene Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11, 12, 17, 18, 27, 28, 39, 40, 53, 54, 63, 65, 73 and 74 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11, 12, 17, 18, 27, 28, 39, 40, 53, 54, 63, 65, 73 and 74 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/21/05 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 11, 12, 17, 18, 27, 28, 39, 40, 53, 54, 63, 65, 73, and 74 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification does not describe said semiconductor thin film includes a polycrystalline silicon having a first particle diameter, wherein said polycrystalline silicon is an irradiation converted substrate that in the prescribed region has a 30 to 80 nm layer of amorphous silicon or polycrystalline silicon having a second particle diameter that is smaller than said first

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particle diameter. The specification describes the irradiation converted substrate having a particle diameter that is larger than a non-irradiated substrate, not a smaller particle diameter.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 17, and 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 17, and 18 recite the limitation "said units" in line 13 of claim 17. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. In view of the 112 rejection above, claims 11, 27, 39, 53, 63, and 73 are rejected under 35 U.S.C. 102(b) as being rejected by Noguchi et al. 5,529,951. Noguchi discloses (see, for example, FIG. 23A-23E) a MOS transistor (thin film semiconductor device) 260 comprising a polycrystalline silicon thin film (semiconductor thin film) 241a, gate insulating film 243, and gate electrode 246. In column 22, lines 46-47, Noguchi discloses the silicon thin film having a thickness of 40 nm (30-80 nm). In column 22, lines 48-54, Noguchi discloses the excimer laser

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light being irradiated on the amorphous silicon layer which recrystallizes the layer to a polycrystalline thin film. This excimer laser light is a single shot radiation that avoids the poor uniformity that is found in the polycrystalline films that have irradiation in several pulses (see, for example, column 2, lines 51-64 of Noguchi). In FIG. 21, Noguchi discloses an excimer laser light (single shot irradiation) 215 that forms a borderless (uniform) silicon thin film.

The limitation “said semiconductor thin film is accumulated by alternately repeating said film forming step and said irradiation step without exposing said substrate to the air” is a product-by-process limitation of producing a thin film with more thickness.

Regarding claims 39, the limitation “irradiated with pulse laser light having an emission time width from upstand to downfall of at least 50 ns” is a product-by-process limitation of converting the semiconductor thin film into polycrystalline silicon.

Regarding claim 73, the limitation “substrate is cooled to a temperature lower than room temperature” is a product-by-process limitation of converting the semiconductor thin film into polycrystalline silicon.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 12, 28, 40, 54, 65, and 74 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. '951 as applied to claims 11, 27, 39, 53, 63, and 73 above, and

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further in view of Tanaka et al. 5,798,744. Noguchi does not disclose a display device comprising a pair of substrates adhered to each other with a prescribed gap, and an electrooptical substance maintained in said gap, one of said substrate comprises a counter electrode, the other substrate comprises a pixel electrode and a thin film transistor driving said pixel electrode.

However, Tanaka discloses (see, for example, FIG. 3) a liquid crystal display apparatus comprising pair of substrates 12/10, liquid crystal (electrooptical substance) 200, counter electrodes 170r, and pixel electrode 150. These components are used to form liquid pixels in a LCD display apparatus. Therefore, it would have been obvious to one of ordinary skill in the art at time of invention to have a display device comprising a pair of substrates adhered to each other with a prescribed gap, and an electrooptical substance maintained in said gap, one of said substrate comprises a counter electrode, the other substrate comprises a pixel electrode and a thin film transistor driving said pixel electrode in order to form the thin film semiconductor device in a LCD display apparatus.

Regarding claim 28, the limitation "said semiconductor thin film is accumulated by alternately repeating said film forming step, where each additional formed film is about 1 nm" produces a semiconductor thin film of greater thickness. Increasing the thickness of a thin film increases its current carrying capacity. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to form a layer of about 30 to 80 nm and accumulate the semiconductor thin films in order to produce a thin film with greater current carrying capacity.

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10. Claim 17 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. 5,529,951 in view of Yamazaki et al. 6,037,197. Noguchi discloses (see, for example, FIG. 23A-23E) a MOS transistor (thin film semiconductor device) 260 comprising a polycrystalline silicon thin film (semiconductor thin film) 241a, gate insulating film 243, and gate electrode 246. In column 22, lines 46-47, Noguchi discloses the silicon thin film 241 having a thickness of 40 nm (30-80 nm). In column 22, lines 48-54, Noguchi discloses the excimer laser light being irradiated on the amorphous silicon layer which recrystallizes the layer to a polycrystalline thin film. This excimer laser light is a single shot radiation that avoids the poor uniformity that is found in the polycrystalline films that have irradiation in several pulses (see, for example, column 2, lines 51-64 of Noguchi). In FIG. 21, Noguchi discloses an excimer laser light (single shot irradiation) 215 that forms a borderless (uniform) silicon thin film. Noguchi does not disclose said units. However, Yamazaki discloses (see, for example, FIG. 1C) a pixel matrix circuit comprising three TFTs (said units). In column 5, lines 43-45, Yamazaki discloses that pixel matrix circuits have more than one million TFTs. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have said units in order to form the thin film semiconductor device in a pixel matrix circuit of an LCD device.

11. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. '951 in view of Tanaka et al. '744 as applied to claims 12, 28, 40, 54, 65, and 74 above, and further in view of Yamazaki et al. 6,037,197. Noguchi in view of Tanaka does not disclose said units. However, Yamazaki discloses (see, for example, FIG. 1C) a pixel matrix circuit comprising three TFTs (said units). In column 5, lines 43-45, Yamazaki discloses that pixel

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matrix circuits have more than one million TFTs. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have said units in order to form the thin film semiconductor device in a pixel matrix circuit of an LCD device.

Response to Arguments

12. Applicant's arguments with respect to claims 11, 12, 17, 18, 27, 28, 39, 40, 53, 54, 63, 65, 73, and 74 have been considered but are moot in view of the new ground(s) of rejection.

The new limitation "single-shot irradiation" is a product-by-process limitation of forming the polycrystalline silicon semiconductor film.

INFORMATION ON HOW TO CONTACT THE USPTO

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee
January 23, 2006

A handwritten signature in black ink, appearing to be 'Eugene Lee', written in a cursive style.